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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/985,870	11/06/2001	Robert J. Small	8317-114	4477
20582	7590	02/24/2004	EXAMINER	
JONES DAY 51 Louisiana Aveue, N.W WASHINGTON, DC 20001-2113			ALANKO, ANITA KAREN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 02/24/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/985,870	Applicant(s) SMALL ET AL. <i>eb</i>	
	Examiner Anita K Alanko	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12/19/03 election.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 9-16 and 46-63 is/are pending in the application.
- 4a) Of the above claim(s) 13 and 48-57 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-12, 14-16 and 58-63 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/26/03</u> | 6) <input type="checkbox"/> Other: _____  |

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***Election/Restrictions***

Applicant's election of Group II in the Paper filed on 8/14/03 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Applicant's election of Species C in the Paper filed on 12/19/03 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Applicant did not elect a second species, species i-iv. However, this species restriction is withdrawn.

Claims 9-16, 48-63 are pending. Claims 9-12, 14-16, 58-63 are examined. Claims 13, 48-57 are withdrawn from consideration as being directed to a non-elected invention.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

*Claims 9-12, 14-16, 58-60, 62-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Streinz et al (US 5,993,686) and Scherber et al (US 5,858,813).*

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Streinz discloses a method for chemical mechanical polishing of tungsten (col.3, lines 26-32) comprising:

providing a semiconductor substrate comprising on one face tungsten and a dielectric material (col.3, lines 26-32);

providing a chemical mechanical polishing composition comprising  
between about 0.5% and about 10% periodic acid (col.3, lines 62-63; col.4, line 10),

between about 0.1% and about 10 % of a secondary oxidizer, malonic acid (col.7, lines 37, 47-48), and

a pH adjusting compound to adjust the pH of the composition, wherein the pH of the composition is about 4-5 (which is within the range cited) (col. 5, lines 47-53);

movably contacting the substrate face with a pad exerting pressure on the substrate and with the composition under conditions that tungsten is removed at a rate different than the removal of the dielectric material.

Streinz fails to disclose the pressure used during the chemical mechanical polishing.

Scherber teaches that a useful pressure during CMP of tungsten (col.10, line 19) with a composition comprising periodic acid (col.5, line 8) and malonic acid (col.5, line 50), which is similar to the composition of Streinz, includes 5 psi (see Tables). The pressure is a result effective variable in that the pressure applied effects the rate of mechanical removal.

Therefore, it would have been obvious to one with ordinary skill in the art to polish at 5 psi, which is within the range cited, in the method of Streinz because Scherber teaches that this is a useful pressure for CMP. It would have been still further obvious to vary the pressure to the

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range cited in the modified method of Streinz because the pressure appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claim 11, Streinz discloses that mixtures of oxidizing agents, including periodic acid and potassium iodate, may be used in the composition (col.3, line 57-col.4, line 4).

As to claim 12, Streinz discloses that  $\text{NH}_4\text{HF}_2$  may be added to the composition (col.4, line 47).

As to claim 14, Streinz discloses that combinations of organic acids (col.7, lines 42-44) including lactic acid, succinic acid, tartaric acid, citric acid, oxalic acid or salts thereof (col.7, lines 33-42) may be used.

As to claims 15-16, the parameters of claim 15 overlap with the base claim. In general, the splitting of one step into two, where the processes are substantially identical or equivalent in terms of function, manner and result, was held to be not patentably distinguish the processes. *Ex parte Rubin* 128 USPQ 440 (PTO BdPatApp 1959).

As to claims 58-59, see the rejection of claim 14.

As to claim 60, Streinz discloses that the composition comprises an abrasive (col.5, lines 54-55).

As to claims 62-63, see the rejection of claims 15-16.

*Claims 9-12, 14-16, 58-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Streinz et al (US 5,993,686) and Scherber et al (US 5,858,813), and further in view of Nakagawa (US 5,700,389).*

The discussion of modified Streinz from above is repeated here.

As to claim 61, Streinz does not disclose to add imidazole to the composition. Nakagawa teaches that imidazole is a useful additive to etching solutions to increase the etch rate and prevent rust (col.2, lines 11-16). It would have been obvious to one with ordinary skill in the art to add imidazole to the composition of Streinz because Nakagawa teaches that it is a useful additive to etching solutions to increase the etch rate and prevent rust.

### *Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art shows methods of polishing metals, for example with periodic acid.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon, Tues & Fri: 8:30 am-5 pm; Wed&Thurs: 10 am-2 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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*Anita K. Alanko*

Anita K Alanko

Primary Examiner

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